Learning Theories and their relevance to Mathematics

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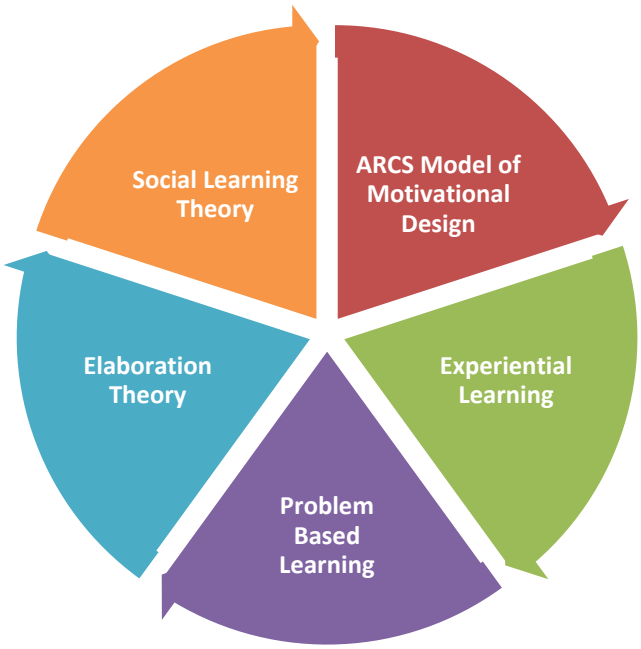

Theory	Useful in Mathematics
ARCS Model of Motivational Design (Keller) Through this model, Keller suggests that there are four key components (i.e. Attention, Relevance, Confidence and Satisfaction) which help to promote and sustain motivation throughout a learning process. First, you must gain a student's attention and maintain it throughout learning. This can be done though perceptual or inquiry arousal. Second, the student must be able to make connections as to why the material they are learning is of importance. This can be achieved through making connections with their interests, experiences, and to relatable real world applications. Third, students need to feel that there is hope in being successful when working on a given task to boost their confidence. At last, a student's confidence and motivation if the outcome of their learning is positive and meets their expectations.	As teachers we constantly have to find new and unique ways to keep our students motivated and focused throughout our lessons and classes. The ARCS model is useful in mathematics classes because it not only looks at students' motivation, but puts a heavy emphasis on attention, relevance, confidence and satisfaction. From experience, I can say that many students are not motivated in math class because at least one of the key components is missing. Students constantly wonder if what they are learning is or will be of any use to them in the near future. Some believe math is a very complex subject which they cannot possibly understand; they lack confidence in themselves and their abilities and thus are not satisfied with their efforts. I believe that the students taking workplace and college level mathematics would benefit a great deal if this theory was implemented on regular bases in their classroom as these are students who would go a long way with motivation, and for many reasons lack it.
Experiential learning (Kolb) This four stage theory is based on hands-on practical experience which builds form applying theoretical knowledge to real world applications. That is, knowledge is created through experiences and our reflections of those experiences.	Although this theory cannot be put into play for all mathematical concepts, it is very important for optimal learning in a classroom. Through hands-on activities and collaborative feedback, students tend to learn and understand the concepts much better. Providing students with some basic fundamentals and allowing them to be creative in ways through which they can expand

The first stage consists of active involvement through listening, reading, watching or doing to create concrete experience. The second stage is of reflective observation, where one determines what was read or done and experienced. The third stage is of abstract conceptualization, which covers connections between the experience and the known. The final stage is when what is learned is put into play through active experimentation. This allows for out-of-the-box possibilities of what could happen if different steps were taken.	their knowledge and thinking is key to learning not only mathematics but also problem solving skills and teamwork. This links back to Dan Mayer's idea of letting the students be creative in the way that they learn rather than teachers spoon-feeding them with step-by-step procedures to answer questions which they can just regurgitate and understand the concepts.
Problem Based Learning (McMaster University) Problem based learning (PBL) is exactly what is says, it's learning that is based on a problem that is given prior to learning any other information. It is a way for students to be creative and explore of different ways to possibly solve a problem and to discover what information they will need or have to look for in order to come up with a solution. PBL provides students with opportunities to take control and take responsibilities for their learning. It helps students build confidence, encourages them to take risks and attempt to solve various questions in a manner that is different than the procedures given in the traditional lesson style.	I believe problem based learning should be a part of every mathematics class. PBL is not only stimulates learning, it also helps strengthens other skills such as teamwork, problem-solving and critical thinking. As Dan Meyer states, mathematics teachers should challenge their students by given them problems with very minimal information so they can be critical and take risks in determining how to come up with a solution. Students would work together and learn from one another rather than compete with one another based on marks. PBL allows students to figure out what they know, what they need to know and how to tackle the problem. I think PBL would fail it was used for a new concept or something which doesn't have enough fundamentals taught already as it would leave students clueless.
Elaboration theory (Reigeluth) Reigeluth, in his theory, states that instructions should be given in smaller chunks rather than all at once. For optimal learning, content should be delivered in order of complexity as it helps students make connections and in the long run, retain more information. By breaking material down to manageable parts, it also helps build confidence in students and allows them to see the whole picture as well as the smaller bits in order to understand and make connections in ways that they will likely remember.	I believe the elaboration theory can definitely be used in all mathematical concepts as many topics in math build on the previous ones. One needs to have the concrete fundamentals, or the building blocks, in order to work on more complex and challenging problems. It is essential to provide students with the simplest version of the problem first for them to understand the material and progressively work their way towards more abstract material. The implementation of this theory would be effective at the start of a new topic or unit; however it would fail if this process is continuously used as students would regurgitate the steps and simply memorize. Also, this theory would not work for abstract or theory based questions that require complex material to be broken down into smaller simpler chunks to be analyzed.
Social Learning Theory (Bandura) Bandura suggests that information and behaviours can be learned simply by observing and modeling. This is done through the processes of attention, retention, motivation and reproduction. Humans have an influence on things based on their observational learning experiences.	This theory is useful when it comes to topics such as algebra or calculus where students require some structure in order to learn and comprehend the material taught. As students observe and follow the way a teacher works through solutions, they are able to retain information and have logical reasoning to support their learning. This would work great at the start of new concepts or topics when students require basic information to build upon. It would not work when it came to other concepts as students can simple reproduce from their lessons.